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Original article

The Impact of State Policies on Vaccine Coverage by Age 13 in an Insured Population

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Abstract

Purpose: To determine the impact of state policies on vaccine coverage among adolescents with managed care insurance.

Methods: We used the 2003 Health Plan Employer Data and Information Set to determine state-specific hepatitis B and varicella vaccine coverage among children with managed care insurance who turned 13 years in 2002. Our outcomes of interest were receipt of hepatitis B and varicella vaccines by age 13. Utilizing weighted least-squares methods, multiple linear regression models were developed to evaluate the relationship between hepatitis B and varicella vaccine coverage and state policies, while controlling for state sociodemographic variables.

Results: Across 28 states, adolescent hepatitis B vaccine coverage ranged from 35.3% to 80.5% (mean = 55.3%) and varicella vaccine coverage ranged from 22.9% to 7.6% (mean = 42.3%). In separate multiple regression models, after adjusting for potentially confounding sociodemographic variables, middle school mandates were significantly associated with hepatitis B vaccine coverage ($p = .002$) and varicella vaccine coverage ($p = .024$). Other policies, including universal purchase of vaccines and availability of philosophic exemptions, were not associated with vaccine coverage in this insured population.

Conclusions: In this population of insured adolescents, middle school vaccine mandates were the only state policy associated with improved hepatitis B and varicella vaccine coverage. Mandates are an effective method for promoting adolescent immunization.

Keywords: Adolescent immunization; State policies; Hepatitis B vaccine; Varicella vaccine

Administering routine immunizations to adolescents has proven challenging. Despite efforts to improve adolescent immunization rates [1], vaccine coverage remains significantly lower for adolescents than for infants and children. According to the 2005 Health Plan Employer Data and Information Set (HEDIS), a nationwide survey of managed care plans, more children than adolescents were fully vaccinated against hepatitis B (87% by age 2 vs. 67% by age 13) and varicella (88% by age 2 vs. 56% by age 13) [2].

The disparity between child and adolescent immunization rates is of concern for several reasons. First, one goal of Healthy People 2010 is to reduce or eliminate indigenous cases of vaccine-preventable disease [3]. Despite this important objective, young adults continue to suffer from vaccine-preventable illnesses that have been nearly eliminated from younger populations [4,5]. Second, in the past year, new vaccines targeted against pertussis and meningitis [6], have been added to the routine immunization schedule for adolescents. A vaccine to prevent human papillomavirus

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has also recently been recommended by the Advisory Committee on Immunization Practices (ACIP) for girls ages 9–26 [7]. Improving adolescent immunization coverage is necessary to comply with current immunization recommendations and to further reduce the burden of vaccine-preventable illness.

The reasons for low vaccine uptake among adolescents are complex. Physician practices [8–10], financial barriers [9–11], and infrequent preventive health visits [9–12] all play a role. State policies, such as mandating vaccination prior to school entry [13–19], not offering philosophic exemptions from vaccine mandates [20–22], and providing universal purchase of vaccines [23,24] have been shown to be associated with higher vaccine coverage. Previous studies of strategies to improve immunization rates among adolescents have been limited by focusing on a single city or state [15,16,19,24] or by evaluating a single policy [14,17,20–23]. The goal of the current study is to determine the relative impact of multiple state policies on hepatitis B and varicella immunization coverage in a national sample of insured adolescents.

Methods

Study design

We conducted cross-sectional analyses to evaluate the associations between state policies and adolescent immunization coverage, using several publicly available, national data sources.

State-level immunization coverage

Outcome variables were state-level hepatitis B and varicella vaccine coverage by age 13. Immunization coverage was determined from the 2003 Health Plan Employer Data and Information Set (HEDIS) Adolescent Immunization Survey, collected by the National Center for Quality Assurance. The HEDIS 2003 Adolescent Immunization Survey included over 100,000 teens insured by one of more than 300 managed care insurance plans across the United States. Data for this survey were collected by chart review or administrative survey and were subject to extensive monitoring by HEDIS for accuracy. These methods are described fully elsewhere [25]. Adolescents enrolled in private managed care plans participating in the HEDIS 2003 Adolescent Immunization Survey who turned 13 during 2002 and received three hepatitis B vaccines by their 13th birthday were reported as immunized against hepatitis B; those who received one varicella vaccine by their 13th birthday (consistent with recommendations at that time) were reported as immunized against varicella. Adolescents with a history of hepatitis B or varicella infection and those with medical contraindications to hepatitis B or varicella immunization were excluded from the HEDIS survey. HEDIS does not report the number of adolescents excluded for these reasons. Participating insurance plans independently reported to HEDIS the proportion of teens enrolled in their plan who were up-to-date with hepatitis B and varicella vaccination. State-level immunization coverage for the hepatitis B and varicella vaccines was reported by HEDIS as the simple (unweighted) average of immunization rates for states with at least five managed care insurance plans completing the Adolescent Immunization Survey.

State policies

We examined several state-level policies as independent predictors of hepatitis B and varicella immunization coverage. First, data on vaccine mandates for school entry were compiled from the Centers for Disease Control (CDC) [26], the Immunization Action Coalition [27,28], and individual states' health department websites. Middle school mandates were defined as state laws requiring immunization prior to entry into 5th, 6th, or 7th grade. For each state, a middle school vaccine mandate was considered to be present if it would have been applied to children who entered 7th grade in 2002. Second, information about whether states offered philosophic exemptions from school entry mandates, as of fall 2001, was collected from the National Vaccine Information Center [29] and from the National Conference on State Legislatures [30]. Third, states with systems for universal purchase of vaccines were identified from the Institute of Medicine's report, *Calling the Shots (2000)* [31]. States that provide all ACIP-recommended vaccines to all children and adolescents in that state at no cost, independent of family income or insurance status were considered to have universal purchase. Fourth, presence of state laws requiring insurance companies to pay for routine child and adolescent immunizations, as of January 2002, was determined from a report by the National Conference of State Legislatures [32]. Fifth, data on state laws related to copayments or deductibles for immunizations came from a 2003 report by Rosenbaum et al at the George Washington Department of Health Policy [33]. As multiple data sources were examined, occasional discrepancies between sources were found. In these cases, information from a primary source, either direct text from state laws or statutes, or information presented on state health department websites was considered to be accurate.

We also collected information on several potential confounders of an association between state policies and state vaccine coverage. State-level sociodemographic data including percent nonwhite population and median household income were obtained from the 2000 U.S. Census [34]. Each state was categorized by region of the country (Northeast, South, Midwest, West).

Statistical analyses

The range and distribution of state-level hepatitis B and varicella vaccine coverage were evaluated descriptively.